

Transportation & ITS Applications

Application Note

Overview

Because of connectivity, scalability, bandwidth utilization efficiency and significant cost advantages, Ethernet is rapidly being deployed as the de facto technology of choice across a wide spectrum of transportation applications. As this migration to Ethernet from legacy TDM based SONET/SDH systems is gaining momentum, a new breed of industrial grade Ethernet backbone switch is required to accommodate the specific needs of the transportation industry.

TC Comm's Industrial Gigabit Ethernet Modular Switch, the **JumboSwitch®**, offers a unique blend of popular Ethernet and legacy interfaces to provide an integrated, cost-effective and reliable set of solutions specifically tailored for the transportation industry. This application note describes some of the key applications of the JumboSwitch for railroads and traffic management in motorways.

JumboSwitch Industrial Gigabit Ethernet Backbone

Features & Benefits:

- Compatible with all popular Ethernet IP devices, traffic controllers, video encoders and emergency phones
- Supports IGMP, VLAN and extensive security features
- Centralized Management System (TCView®) including remote software downloads and live operating temperature for each interface card
- Dynamic bandwidth allocation enables 100's of live video streams
- Industrial Hardened (Exceeds NEMA TS-2)
- Self-Healing topology, including RSTP, with fault recovery of less than 38 msec.
- Long reach optics over single mode fiber extends the distance between JumboSwitch nodes to over 100Km
- Real Time Serial Server for legacy traffic controllers

Interfaces:

- Ethernet (802.1Q, 802.1P, 802.1ag)
- DCS/SCADA
- Teleprotection
- Serial interfaces (RS-232, RS-422/RS-485)
- Integrated PABX
- T1/E1 over Ethernet
- Ethernet over PDH (T1/E1, T3/E3, STS-1/STS-3 Clear Channel)
- 600 Ohm analog
- G.703/64k
- Dry Contact



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Light Rail

Subways, trolleys and other forms of urban transportation vehicles are all examples of "Light Rail" transportation. Figure 1 below illustrates how the JumboSwitch gigabit multi-service modular switch can be used for light rail applications.

In light rail and metro rail systems, reliable communications for Network Operation Centers-to-Station (NOC) and Station to Station applications are critical to help ensure passenger safety and convenience. The JumboSwitch can be deployed in wayside cabinets as a reliable

communications backbone for applications such as public address systems, ticket vending machines, video surveillance and security systems. The JumboSwitch also natively supports delay-sensitive, mission-critical control and signaling applications normally served by separate TDM-based products.

Figure 1 depicts a typical communication network in a commuter rail. The interfaces and applications include:

- RS-232 – Serial Communications with Ticket Vending Machines (TVMs)
- 10/100/1000 – Ethernet Communications with IP Cameras and other IP-Based Products
- FXO/FXS – Telephone Connections for Emergency Assistance and connectivity to the PSTN
- 2/4-Wire E&M – 600 Ohm Audio communications with Public Address Paging System and Radio Communications between the Network Operation Centers and Stations

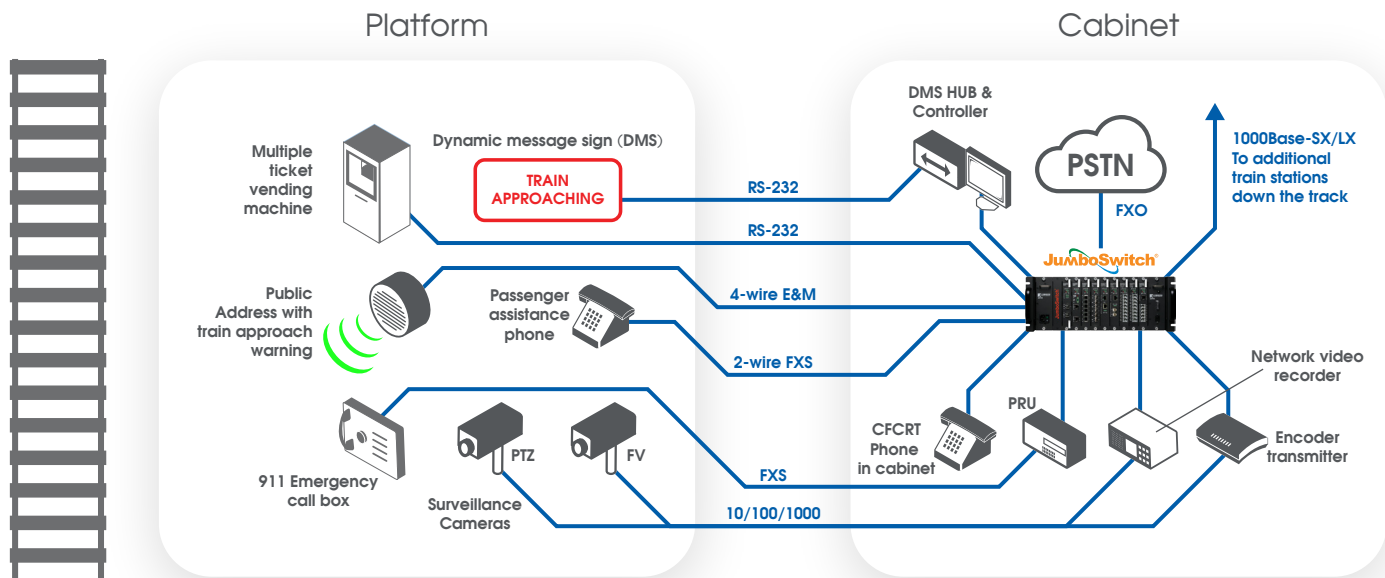


Fig 1: Typical train station application using JumboSwitch in a rail-side cabinet

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Heavy Rail

A heavy rail system is an electric railway with the capacity to handle a heavy volume of traffic compared to a "light rail" system. Critical applications for heavy rail systems include: voice, video, data, and real time information between Network Operation Centers (NOC), trains and stations. In addition, these critical applications must support real time signaling and central network management for electronic interlocking systems required in the NOC.

Figure 1 illustrates how a JumboSwitch Gigabit Ethernet backbone can seamlessly extend Serial, Ethernet and hundreds of encoded (e.g. MPEG 2) video streams over "long reach" 1000Base-SX/LX links spanning hundreds of kilometers. Comprehensive centralized network management is provided by TCView®.

Traffic Management

The JumboSwitch is ideal for implementing advanced traffic management systems (ATMS) in Intelligent Transport Systems (ITS). In most cases, these systems are deployed at intersections or used for communications between signal management systems to coordinate operation of traffic signals. Figure 2 illustrates how JumboSwitch is utilized for reliable data connectivity between roadside cabinets in a traffic application. A JumboSwitch gigabit backbone can support hundreds of MPEG 2 video streams. It also supports voice applications (full featured PBX) with its FXS/FXO modules and

real time traffic management applications with its RS-232 modules. JumboSwitch networks are centrally managed by TCView which provides comprehensive Fault, Configuration, Asset, Performance and Security management.

JumboSwitch Overview

The JumboSwitch is a modular Gigabit Industrial Ethernet Switch for Backbone, Edge and Access applications. It is designed to maintain the reliability and survivability of SONET/SDH (less than 38 msec recovery) and still offer the plug-and-play simplicity of Ethernet.

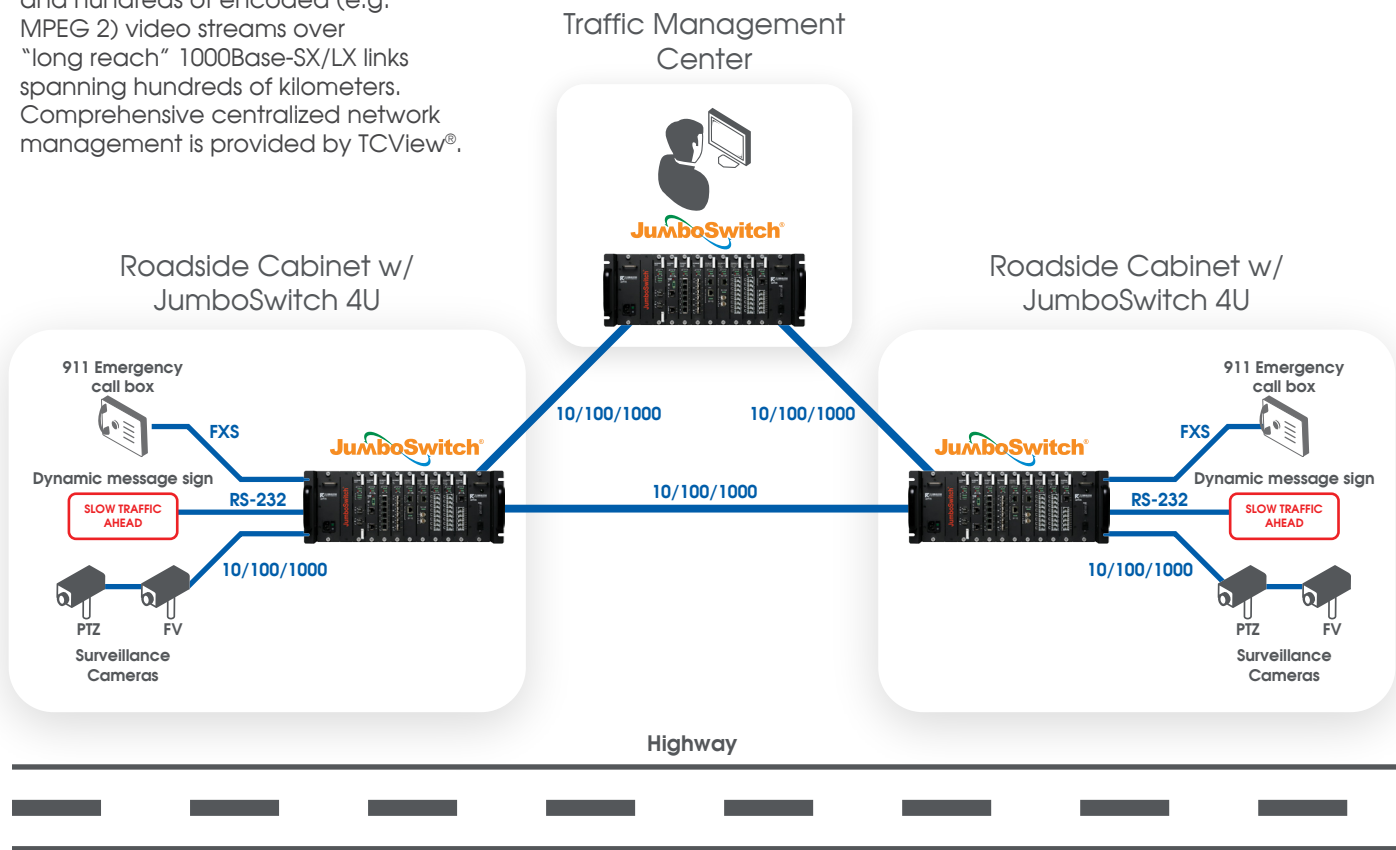


Fig 2: Traffic application using JumboSwitch in a road-side cabinet

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The JumboSwitch offers four cost-efficient chassis options that can hold from 1 to 7 interface cards. For example, a 4U chassis with 7 interface cards could be located in a Traffic Operations Center. The economical 2S unit, with 2 cards, could be located in various traffic control cabinets that are connected to the network.

The JumboSwitch product family meets all pertinent industry-specific standards for environmental, security and performance requirements including NEMA TS-2 and NERC CIP. Future JumboSwitch family products will continue to be compliant with both existing and emerging industry standards and requirements, including developing Ethernet standards.

TCView (Advanced Management System)

TCView provides the comprehensive management tools needed to simplify the configuration, administration, monitoring, troubleshooting and servicing of JumboSwitch networks and other TC Communications networking devices. Designed with FCAPS (Fault, Configuration, Accounting, Performance, Security) in mind, TCView enhances network administration by simplifying both repetitive and one-time tasks, such as reconfiguring switches and gateways, monitoring network performance and isolating faults.

Key Features:

- Remote software/firmware download capability
- Extensive Asset Management capabilities including ongoing collection of system part/serial numbers and version numbers/upgrade dates for precise inventory management
- Remote monitoring for “live” operating temperatures and power consumption of each interface card
- Remote monitoring for “live” TX/RX power for critical fiber links

These features can be especially critical for industrial applications. For example, TCView’s precise power consumption and temperature sensing capabilities can be used to create real time preventive maintenance parameters (e.g. identify any degradations) for Transportation network IEDs being used in extremely hot or cold environments.



17881 Cartwright Road Irvine, CA 92614 | +1-949-852-1972 | tcomm.com

Note: Information contained in this document is subject to change without prior notice.
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